Mesoscopic Traffic Simulator

A mesoscopic traffic simulator (MesoTS) is used in TMS to predict traffic conditions in the network - the information needed for generating anticipatory route guidance. MesoTS starts with a given initial network state, predicted travel demand, and candidate control and route guidance and simulates vehicular flow using speed-density relationships and route choice models. Capacities for each segment and turning movements at intersections are periodically updated based on the traffic signal settings and the volume and composition of approaching traffic flows. The simulation of vehicle movements in MesoTS consists of two phases: an *update phase* and an *advance phase*. The update phase calculates speeds of *traffic cells* - groups of vehicles located in the vicinity of each other. The advance phase moves individual vehicles based on the speeds of the traffic cells they belong to. Each update phase may consist of one or more advance phases. Individual vehicles' approximate positions are tracked and as spacing between vehicles changes cells are split and combined. MesoTS outputs time variant link traffic counts, travel times, and other variables of interest.

- Network Representation
- Traffic Cells and Traffic Streams
- Capacity Constraints
- Traffic Dynamics
  - Speed-Density Model
  - Cell-Following Model
    - Step 1:
    - Step 2:
- Vehicle Characteristics
- Vehicle Routing
- Input and Output
- Computational Tests and Validation

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